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Pan-Antarctic Investigations of Mesospheric Wave Dynamics and Influences Using the ANGWIN Network

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Data Management Plan

This project supports the continued operations of 6 sensitive digital cameras:

- 4 all-sky imagers (ASIs), measuring the brightness of the mesospheric OH layer at ~87 km, located at McMurdo, Davis, Rothera and South Pole;
- 2 Advanced Mesospheric Temperature Mappers (AMTMs), able to measure the atmospheric temperature at the same OH altitude, located at the South Pole and McMurdo.

During year 1, an automatic Rayleigh lidar will be deployed at the South Pole station to provide vertical temperature information. The all-sky cameras image the OH emission in the IR (900 to 1500 nm) to provide wide-field (180°) information on the gravity wave activity at the MLT (mesosphere lower-thermosphere) level. The AMTMs give additional information, providing "maps" of the MLT temperature over a large region (~200x160 km). The measurements will be made over the next five winter seasons (2021-2025) to quantify waves over a broad range of scales, to determine their intrinsic properties (where wind data are available), and their momentum fluxes over Antarctica. All the imagers operate during the winter season (from ~March to ~October, depending on the site latitude), with minimal contamination by moon light and auroral emissions.

Are the data (check all that apply)?
New observational data.

Approximately how much data will be produced each year?
The imagers acquire 320x256-pixel pictures of the night sky every 10s with a 16-bit format. They run automatically throughout the winter season producing a total of ~**200 GB**/season for each of them. The total will be ~**1.2TB** per year. The Rayleigh lidar will operate primarily during the winter season (but can also operate under daylight conditions), and will generate a total of ~ **5 GB** per year.

What meta-data will be part of the data sets produced?
Each image has the associated meta-data: UT time, date, emission wavelength, site coordinates, file format (TIFF), and emission altitude (assumed). This information is sufficient for processing the data to produce maps of emission brightness for studying short period gravity waves over each site. The AMTM data are processed to produce intensity and temperature zenith plots and temperature maps.

How will data be made available to other researchers? To the general public?
The image data will be available online (http://digitalcommons.usu.edu/ail/). Password to access the database will be provided upon request to the PI.

Other
In addition to the USU imagers' measurements, other supporting datasets are also available for collaborative research. These instruments are operated by colleagues in other organizations: the DLR Institute in Oberpfaffenhofen, Germany (Director M. Rapp), and University of Alaska Fairbanks (PI: M. Conde). As such, all users of any collaborative data are encouraged to contact the instruments PI, where appropriate, to ensure that they obtain the most suitable data product for

their purposes and in order to receive the appropriate acknowledgment of NSF (and other institutional) support for inclusion in any publication employing these data.

If digital data will be made available what file format(s) will be used (ex: HDF5, NetCDF)
The cameras use the international TIFF image format greatly simplifying data transfer and analysis by other researchers.

How long do you expect to keep the data private before making it available? If applicable, provide description of policies for the protection of proprietary data, privacy and confidentiality, and intellectual property. Please explain if different data products will become available on different schedules (ex: raw data vs processed data, observations vs models, etc…)
For the imagers operating at South Pole, the data are regularly transferred by the research assistant so that we have new data on average every week. At other sites, internet access is more limited thus the data will only become available to us typically several months later (McMurdo) or when it is shipped to us by our colleagues at AAD or BAS a year later. The processed data will be available to the public after they have been received and processed.

Describe policies (if any) for re-use, re-distribution and production of derivatives:
We use the NSF CEDAR Rules of the Road concerning use of the data and its subsequent re-use. These rules stipulate that any user should contact the data provider (PI) to request use of the data for their research and offer possible co-authorship if relevant.

How long do you expect the data be available after the funding for the project has ended? Will it be archived somewhere for long term archiving and curation?
The data are archived on hard disks, with a full backup, and also stored on the cloud by the USU library. We anticipate these data/information will be available at USU for the foreseeable future.

Additional comments
With data already obtained from South Pole (by AMTM and all-sky imager), McMurdo, Davis, Rothera and Halley stations (all-sky imagers), we have collaborated with several researchers who have used these data for their studies. These include Drs. Takuji Nakamura, Takeshi Matsuda, and Masaru Kogure (NIPR, Japan), Dr. Kim Nielsen (UVU, UT), Drs. Robert Stockwell and Bifford Williams (GATS, CO), Dr. Tracy Moffat-Griffin, and Dr. P. Espy (BAS, UK/NTNU, Norway), Dr. Nick Mitchell (University of Bath, U.K.), Dr. Irfan Azeem (ASTRA, CO), Drs, Scott Palo and Xinzhao Chu (University of Colorado at Boulder, CO). We anticipate further collaborations using the new measurements proposed herein.